ORDER NO. KMS9810326A1
F5

Service Manual

Simplified

DSS CONSOLE FOR DIGITAL
SUPER HYBRID SYSTEM

KX-T7440

White Version

KX-T7440-B

Black Version

(for U.S.A.)

Please file and this manual together with the service manual for Model KX-T7440C/KX-T7440C-B, order No. KMS9809313C1.
This service manual indicates the main differences between; Original KX-T7440C/KX-T7440C-B and KX-T7440/KX-T7440-B.

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians.
Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

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PARTS COMPARISON TABLE (Change from original pages 23 and 24.)

Ref. No.	Part No.		Part Name & Description	Pcs /set	Remarks
	KX-T7440C/ KX-T7440C-B (Original)	**KX-T7440/ KX-T7440-B**			
CABINET AND ELECTRICAL PARTS					
4	PSBX1054Z1	**PSBX1054Z3**	BUTTON, 16KEY (KX-T7440)	3	
4	PSBX1054Z2	**PSBX1054Z4**	BUTTON, 16KEY (KX-T7440-B)	3	
5	PSBX1055Z1	**PSBX1055Z3**	BUTTON, 18KEY (KX-T7440)	1	
5	PSBX1055Z2	**PSBX1055Z4**	BUTTON, 18KEY (KX-T7440-B)	1	
10	PSQT1309X	-------	LABEL, CAUTION (KX-T7440C)	0	Deletion
10	PSQT1309W	-------	LABEL, CAUTION (KX-T7440C-B)	0	Deletion
11	PQQT11166Z	-------	LABEL, NOTE	0	Deletion
	-------	**PSGT1567Z**	NAME PLATE (KX-T7440)	1	Addition
	-------	**PSGT1612Z**	NAME PLATE (KX-T7440-B)	1	Addition
ACCESSORIES AND PACKING MATERIALS					
	-------	**PSQX1526Z**	INSTRUCTION BOOK	1	
P2	PSPK1375Z	**PSPK1393Z**	GIFT BOX (KX-T7440)	1	
P2	PSPK1418Z	**PSPK1431Z**	GIFT BOX (KX-T7440-B)	1	
MAIN BOARD PARTS					
PCB1	PSWPT7440C	**PSWPT7440UK**	MAIN BOARD ASS'Y (RTL)	1	

I(Q) KXT7440UK
KXT7440BUK
Printed in Japan
KMG

ORDER NO. KMS9809313C1
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Service Manual

DSS Console for Digital Super Hybrid System

KX-T7440C

White Version

KX-T7440C-B

Black Version

(for Canada)

■ DIMENSIONS AND WEIGHT

Dimensions: 156(W)X72(H)X232(D)mm

Weight: 480g

Design and specifications are subject to change without notice.

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When you mention the serial number, write down all 11 digits. The serial number may be found on the label affixed to the bottom of the unit.

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FOR SERVICE TECHNICIANS

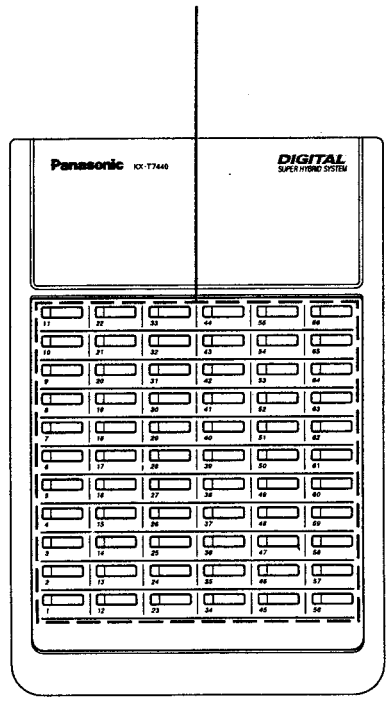
Note the following items when exchanging the LEDs (Ref. No.D2~67) of P. C. Board.

1) Do not reuse a LED which is removed from the P.C. Board.
2) Use a soldering iron (less than 15 W) for exchanging LED.
3) Do not heat the LED for more than 2 seconds.
4) Do not move the LED after soldering.

LOCATION OF CONTROLS

DSS Buttons with Busy Lamp Field (BLF):
The KX-T7440 has 66 DSS buttons.
To access an extension, simply press a DSS button.
These buttons also can be assigned for one-touch dialling.
The BLF indicates the current status of the corresponding extension.

Off : Idle
Red : Busy

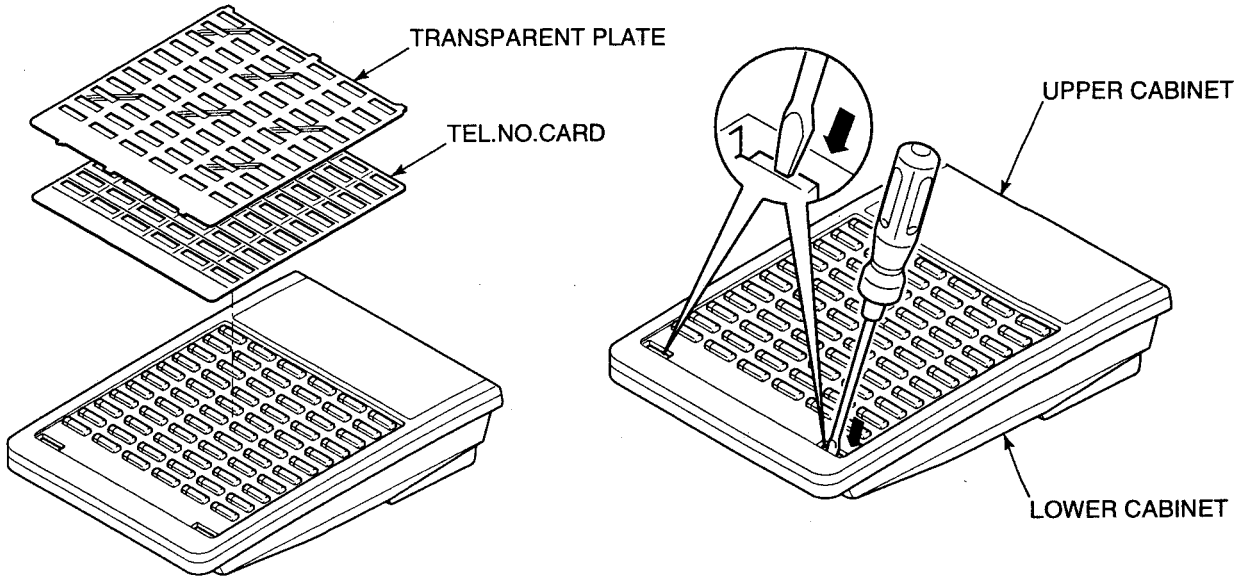


DISASSEMBLY INSTRUCTIONS

No. 1	HOW TO REMOVE THE UPPER AND LOWER CABINETS

Procedure 1

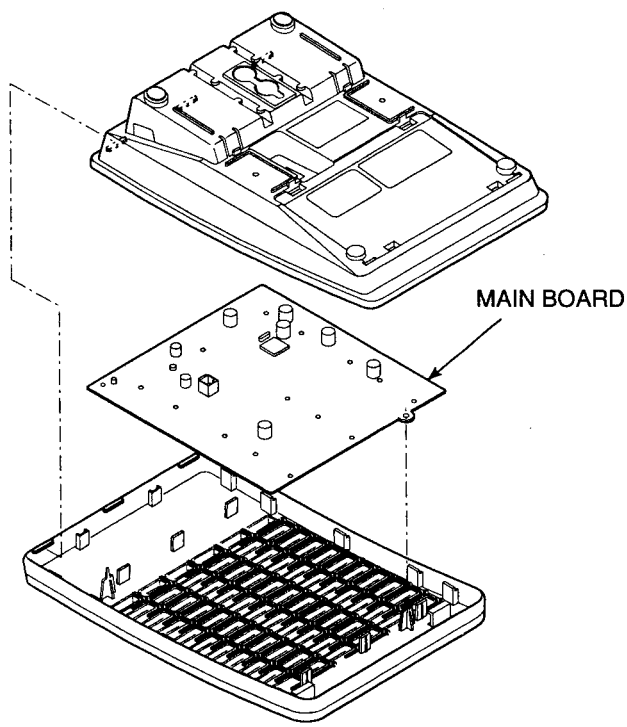
1) Remove the transparent plate and TEL. No. card.
2) Remove the upper and lower cabinets.



No. 2	HOW TO REMOVE THE MAIN BOARD

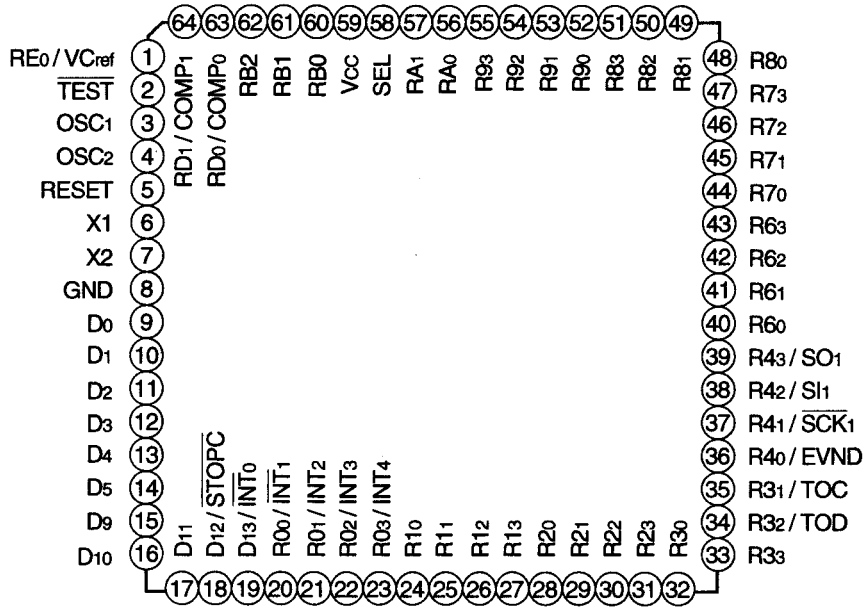
Procedure 1→2

1) Remove the main board.



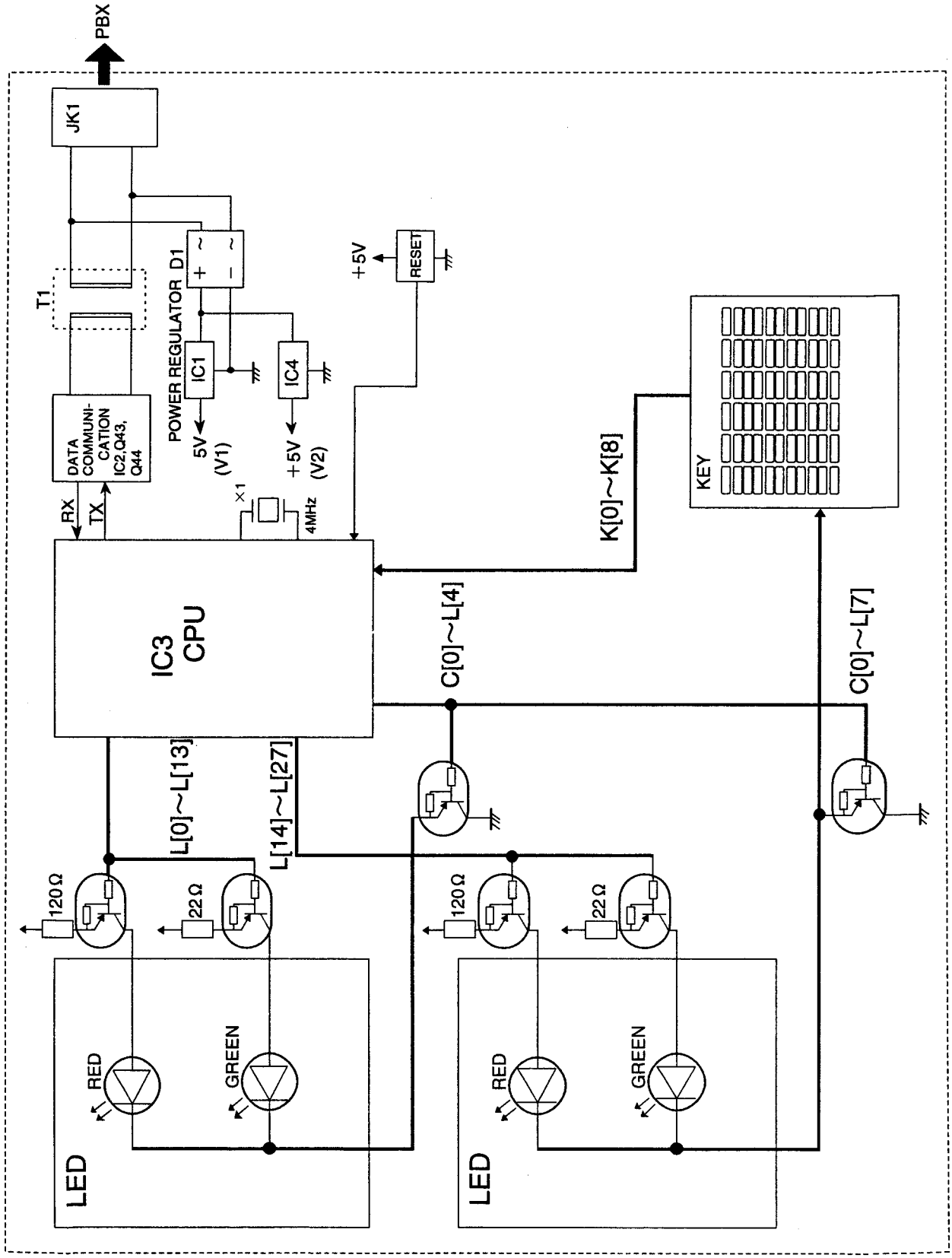
IC DATA

1. IC3


1 RE0 / VCref
2 TEST
3 OSC1
4 OSC2
5 RESET
6 X1
7 X2
8 GND
9 D0
10 D1
11 D2
12 D3
13 D4
14 D5
15 D9
16 D10
17 D11
18 D12 / STOPC
19 D13 / INT0
20 R00 / INT1
21 R01 / INT2
22 R02 / INT3
23 R03 / INT4
24 R10
25 R11
26 R12
27 R13
28 R20
29 R21
30 R22
31 R23
32 R30
33 R33
34 R32 / TOD
35 R31 / TOC
36 R40 / EVND
37 R41 / SCK1
38 R42 / SI1
39 R43 / SO1
40 R60
41 R61
42 R62
43 R63
44 R70
45 R71
46 R72
47 R73
48 R80
49 R81
50 R82
51 R83
52 R90
53 R91
54 R92
55 R93
56 RA0
57 RA1
58 SEL
59 VCC
60 RB0
61 RB1
62 RB2
63 RD0 / COMP0
64 RD1 / COMP1

Classification	Terminal Signal	Pin Number	Input / Output	Function
Power	Vcc	59		Adds the power voltage.
	GND	8		Connects.
Test	$\overline{TEST}$	2	Input	There is no terminal for the user application. Connects the Vcc voltage.
Reset	RESET	5	Input	Used to reset the MCU.
Oscillation	OSC_1	3	Input	These are the input / output terminals for the main oscillator. Please connect to a ceramic oscillator, crystal oscillator, or an exterior oscillating circuit.
	OSC_2	4	Output	
	X1	6	Input	These are input / output terminals for the save oscillator. Please connect to a 32.768kHz crystal. When not using a 32.768kHz crystal oscillator, set terminal X1 to Vcc and open terminal X2.
	X2	7	Output	
Port	D_0~D_5 D_9~D_{11}	9~17	Input/ Output	There is an addressing input / output terminal for each byte. D_0-D_3 terminals can supply a maximum of 10mA current to each terminal in the source current input / output terminal. D_4, D_5, $D_{9\sim11}$ terminals can supply a maximum of 15mA current to each terminal in the sink current input / output terminal.
	D_{12},D_{13}	18,19	Input	These are addressing input terminals for each byte.
	$R0_0$~$R4_3$ $R6_0$~RA_1	20~57	Input / Output	These are addressing input / output terminals for each 4 bytes.
	RB_{02},RD_{01},RE_0	60~64,1	Input	These are addressing input terminals for each 4 bytes.
Interrupt	$\overline{INT_0}$,$\overline{INT_1}$, INT_2~INT_4	19~23	Input	These are the exterior separation input terminals.
Stop Clear	$\overline{STOPC}$	18	Input	This input terminal is used to change from the stop mode to the active mode.
Serial Interface	$\overline{SCK_1}$	37	Input / Output	This is the serial interface clock input terminal.
	SI_1	38	Input	This is the serial interface receiving data input terminal.
	SO_1	39	Output	This is the serial interface sending data output terminal.
Timer	TOC,TOD	35,34	Output	These are the timer output terminals.
	EVND	36	Input	This is the event input terminal.
Voltage Comparator	$COMP_0$,$COMP_1$	63,64	Input	These are the comparator analog input terminals.
	VCref	1		This is the analog input terminal threshold voltage standard level power terminal.
Frequency Division Comparison Selector	SEL	58	Input	After setting to the reset position when the stop mode returns to the active mode, this is the terminal which selects the system lock frequency division comparison. If 4 frequency division is selected, connect to the Vcc voltage. If 32 frequency division is selected, connect to the GND voltage.

BLOCK DIAGRAM



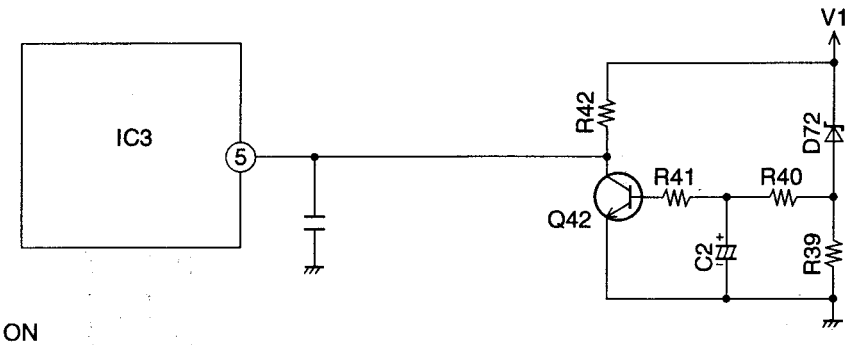
CIRCUIT OPERATIONS

1. RESET CIRCUIT

1) Circuit Operation

This circuit is used for transmission of a reset pulse to the CPU (IC3) at the following times, connecting the telephone line jack, circuit operation. The timing chart is shown below.

Circuit Diagram



Power ON

↓

Q42 OFF

The reset signal wiu increase along with the power voltage.

↓

D11 zener diode ON

↓

Start current to C2.

Increase the base voltage of Q42.

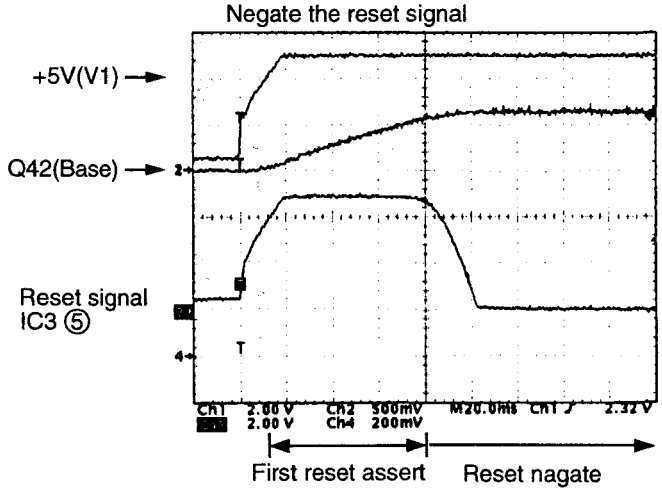
↓

Q42 ON

↓

Reset signal assert.

Negate the reset signal

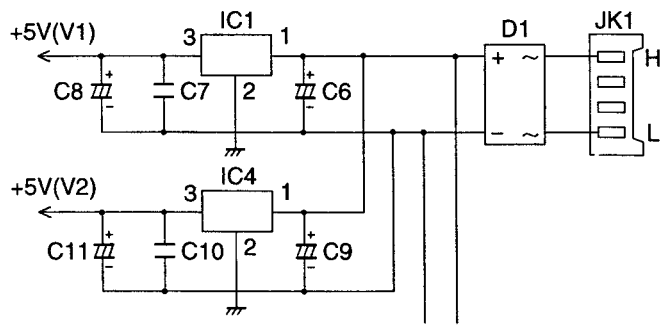


2. POWER SUPPLY CIRCUIT

1) Circuit Operation

The +16V DC, provided from the DSS console is converted to +5V by the voltage regulator IC (IC1. IC4).

Circuit Diagram



3. KEY INPUT CIRCUIT

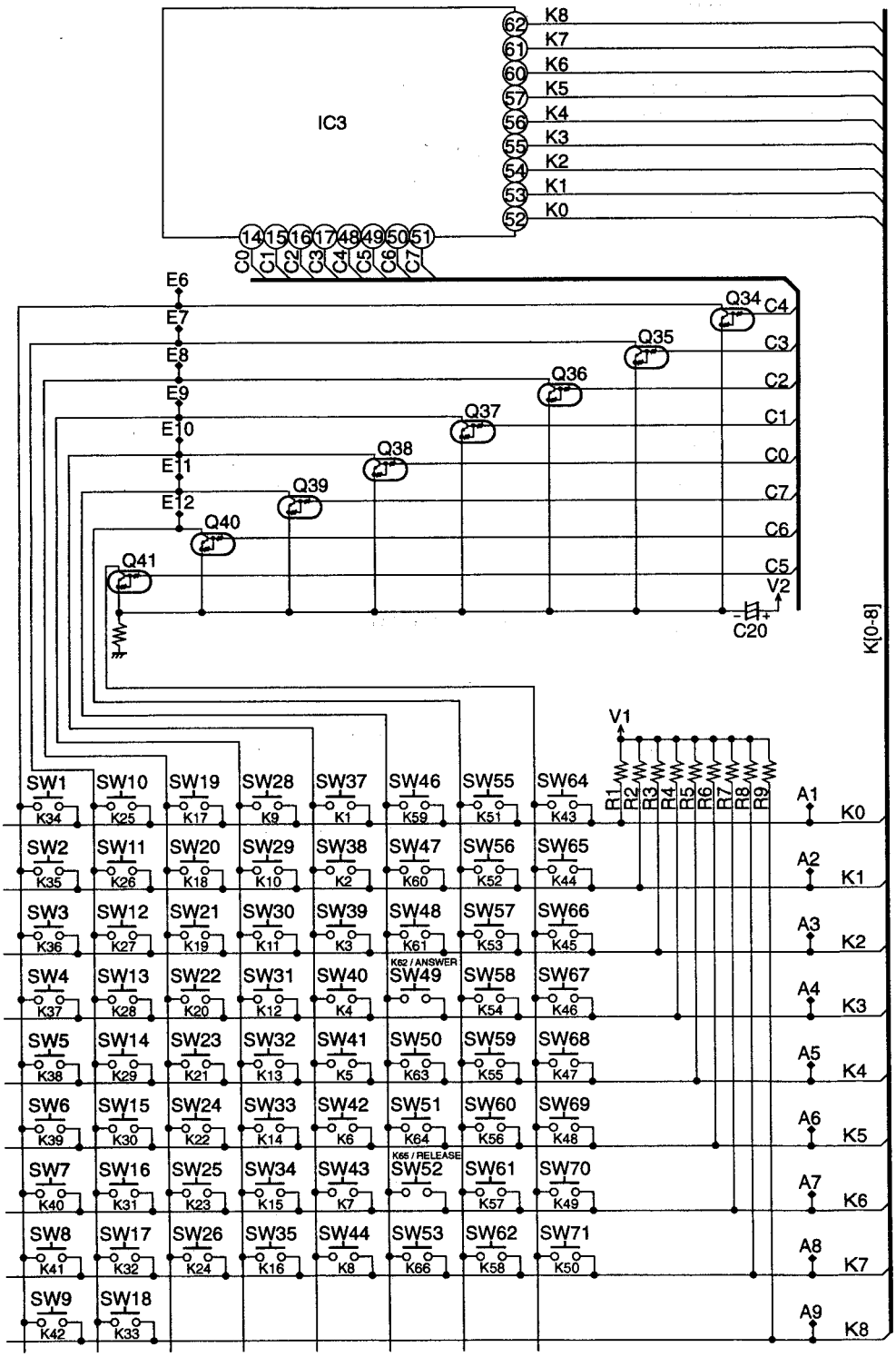
1) Circuit Operation

The I/O ports K0~K8 of IC3 are used with alternate switching, and they are used as input ports as in the case of the key input.

2) Key Input Circuit

Sequential input information (negative logic) from the DSS console is executed by dynamic scanning.
The ports K0 ~ K8 of IC3 are brought to low status consecutively. If a key is pressed, the input of key-in information is executed by ports C0 ~ C7.

Circuit Diagram



4. DATA COMMUNICATION CIRCUIT

1) Function

The data communication circuit serves the following functions:
Information exchanger between DSHS and DSS console, key input information as well as data for the LED control, etc.
This information is continuously at times.

2) Circuit Operation

When the DSS console receives an IRQ signal from the DSHS and after sending the key input information (19 pulses) to the DSHS and receiving data (47 pulses) for LED control, etc. The DSS console will return to the DSHS an acknowledge signal.

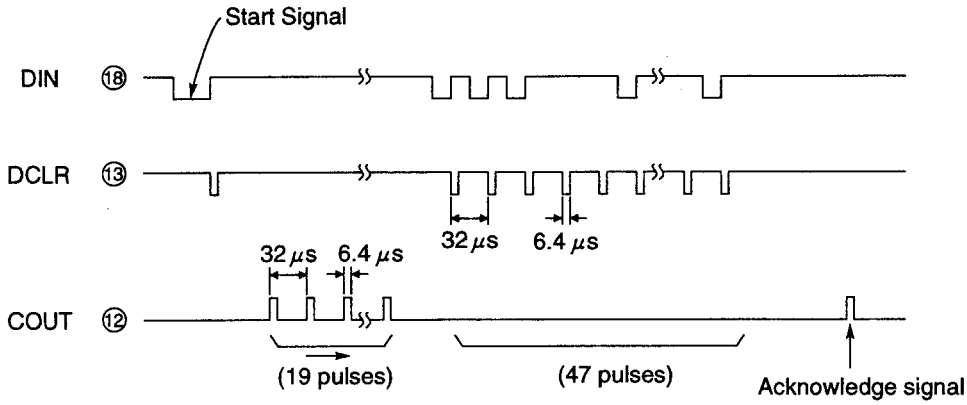
3) Reception

The data from the DSS console is received via the H and L line along the path shown below.
H, L Line → D1 → T1 → R49 → Q43 → IC2 → IC3 ⑱

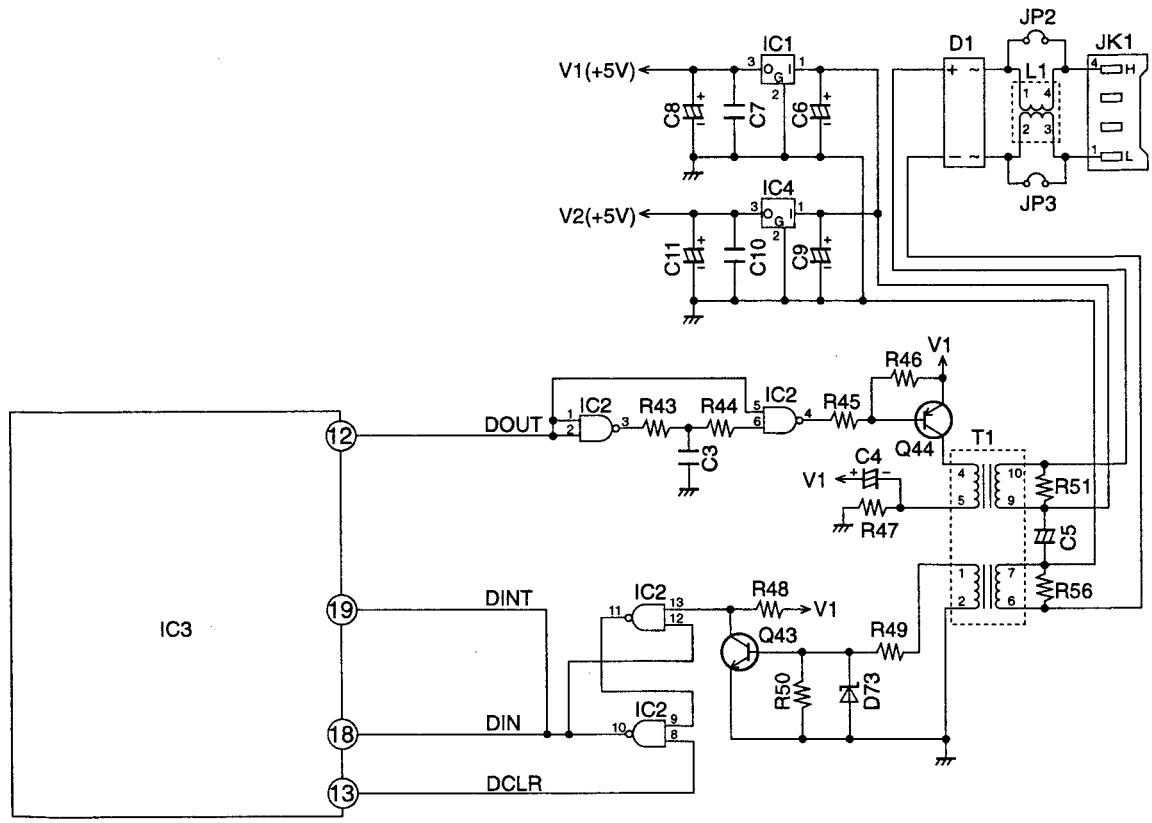
4)Transmission

The data to the DSS console is transmitted along the following path.
IC3 ⑫ → IC2 → R45 → Q44 → T1 → P1 → H, L line.

Timing Chart

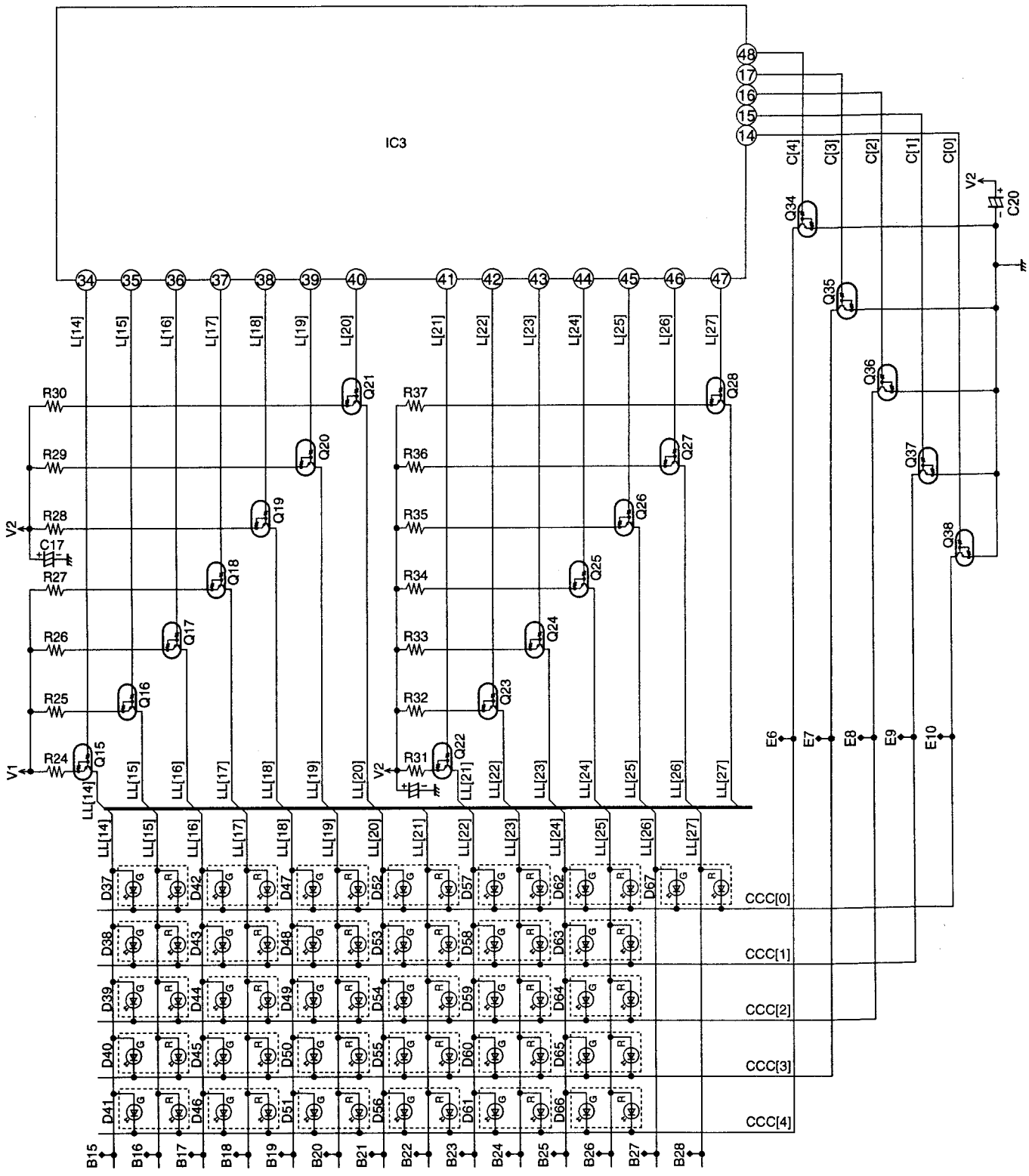


Circuit Diagram



5. LED CIRCUIT

Circuit Diagram

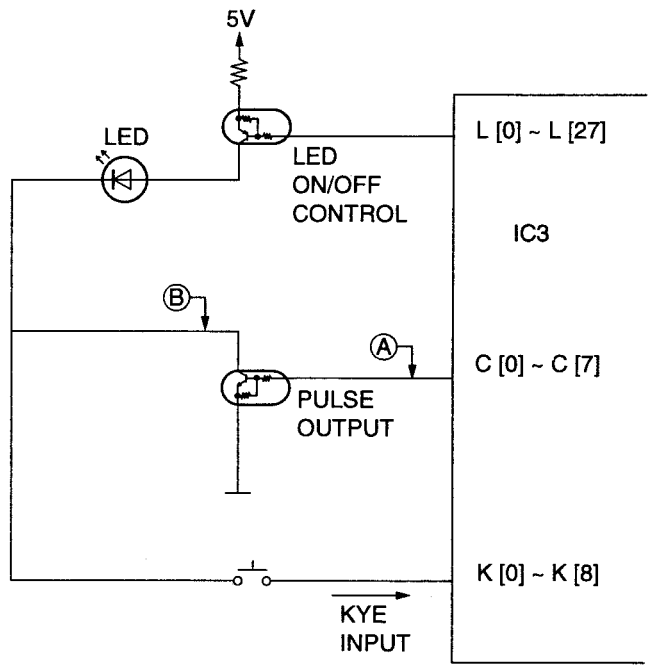


6. LED CIRCUIT KEY INPUT CIRCUIT

1) Circuit Operation

A drive pulse wave, as in Fig. 1, is output by IC3. That signal goes through the drive digital transistor and connects the key button and LED cathode. By pressing the key, the drive pulse wave is input to the keyboard. In order to light the appropriate LED, the LED control port is turned ON. That result LED is lit by the pulse driver.

Circuit Diagram



Ⓐ Each Cannel's Pulse Output

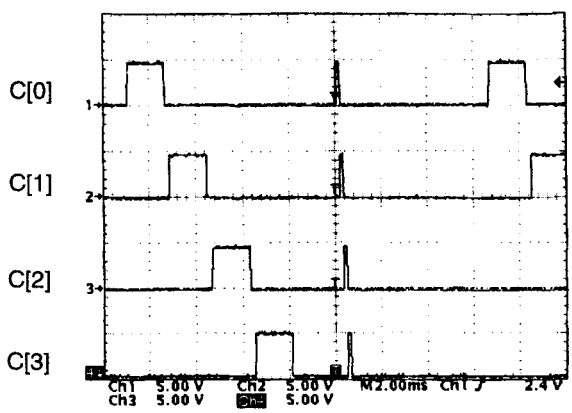


Fig. 1

Ⓐ and Ⓑ's Wave

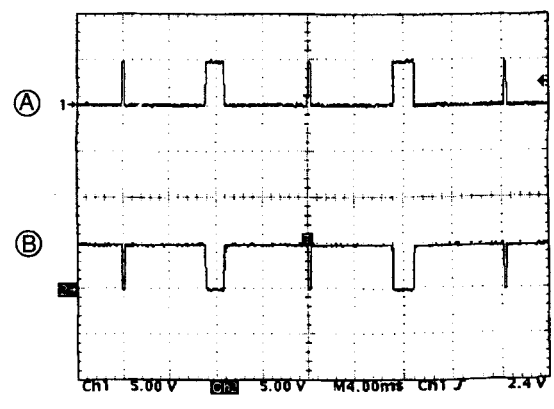
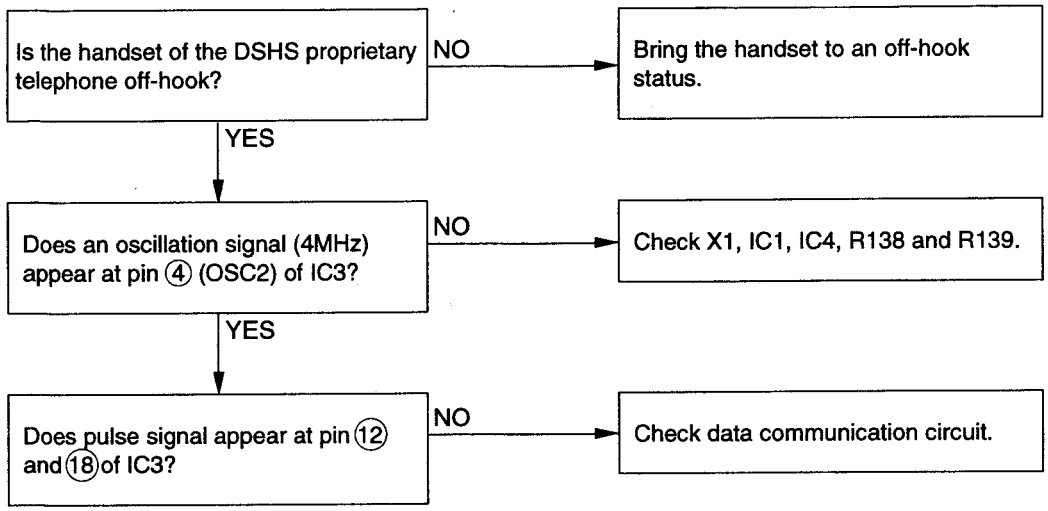


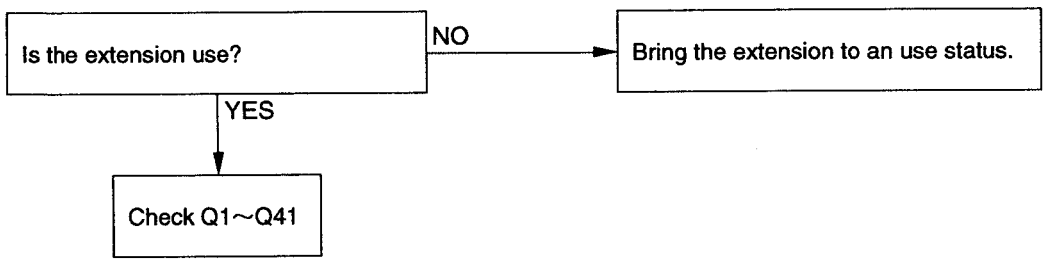
Fig. 2

TROUBLESHOOTING GUIDE

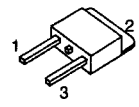
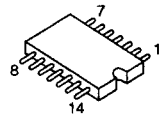
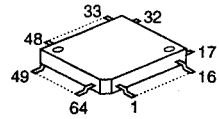
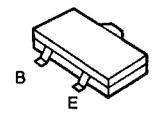
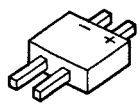
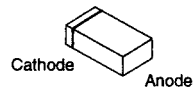
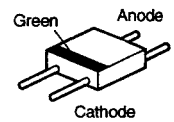
1. NO OPERATION


Is the handset of the DSHS proprietary telephone off-hook?
NO
Bring the handset to an off-hook status.
YES
Does an oscillation signal (4MHz) appear at pin ④ (OSC2) of IC3?
NO
Check X1, IC1, IC4, R138 and R139.
YES
Does pulse signal appear at pin ⑫ and ⑱ of IC3?
NO
Check data communication circuit.

2. LED DOES NOT LIGHT



TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

 PSVIBA05FP	 PQVITC4011BF	 PSVI4068A03H	 2SA1576Q, PQVTDTC143E PQVTDTA143XU PQVTDTD133HK, 2SC4081Q
 PQVDS1ZB60F1	RLS71	 PSVDUDZ39B	 PQVDPY1204

HOW TO REPLACE THE FLAT PACKAGE IC

If you do not have the special tools (for example: SPOT HEATER) to remove the SPOT HEATER'S Flat IC, if you have solder (large amount) a soldering iron and a cutter knife, you can easily remove IC's even though large than 100 pin.

1. PREPARATION

- SOLDER - - - - - - - - Sparkle Solder 115A-1, 115B-1
  OR
  Almit Solder KR-19, KR-19RMA

- Soldering iron - - - - - Recommended power consumption is between 30 W to 40 W.
  Temperature of Copper Rod 662 ± 50 °F (350 ±10℃)

  (An expert may handle a 60~80 W iron, but a beginner might damage the foil by overheating.)

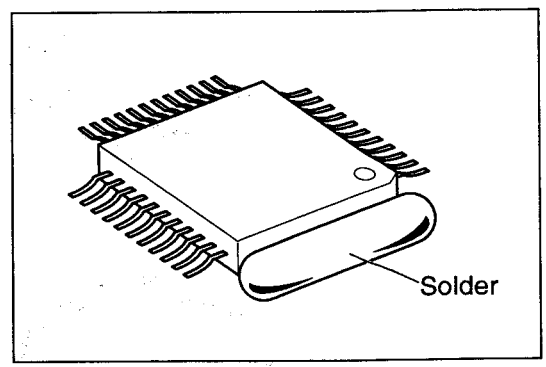
- Flux - - - - - - - - - - - HI115 Specific gravity 0.863

  (Original flux should be replaced daily.)

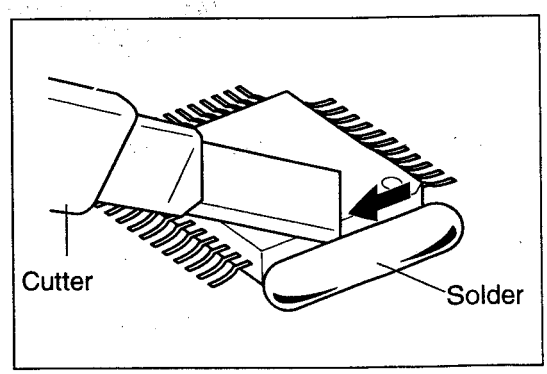
2. FLAT PACKAGE IC REMOVE PROCEDURE

1) When all of the IC lead can not been seen at the standard degree, fill with large quantities of solder.

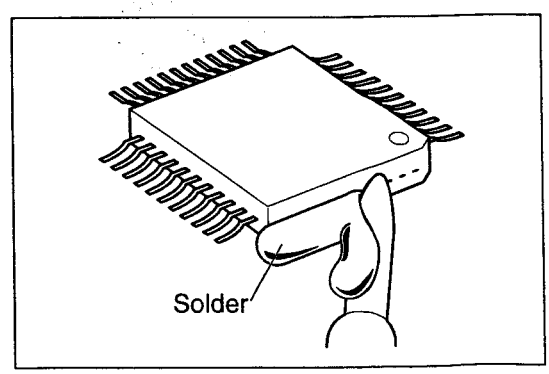
Note:
If you do not fill with solder and directly cut the IC lead with the cutter, stress may build up directly in the P.C.board's pattern. If you do not fill with large quantities of solder as in step 1 the P.C.board pattern may be removed.



2) Using a cutter, cut the lead at the source.
(Cut the contents with the cutter lightly 5 or 6 times.)



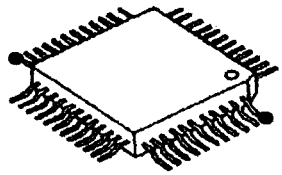
3) Remove when the solder melts.
(Remove the lead at the same time.)



After removing the Flat IC and when attaching the new IC, remove any of the excess solder on the land using the soldering wire, etc. If the excess solder is not removed from the land, the IC will slip and not be attached properly.

3. FLAT PACKAGE IC INSTALLATION PROCEDURE

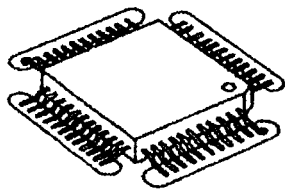
1) Temporarily fix the FLAT PACKAGE IC by soldering on the two marked pins.



●- - - - - -Temporary soldering point.

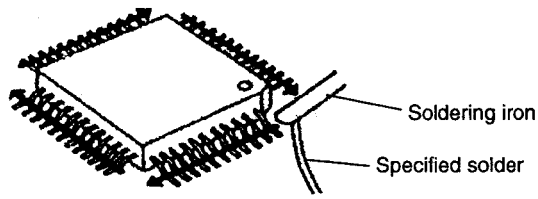
*Check the accuracy of the IC setting with the corresponding soldering foil.

2) Apply flux to all pins of the FLAT PACKAGE IC.



- - - - - Flux

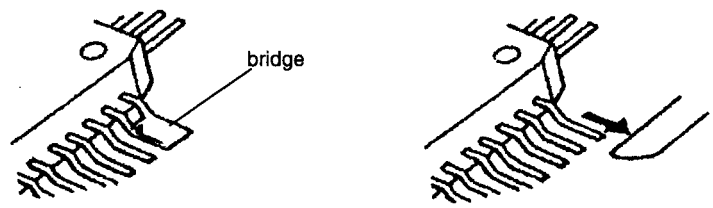
3) Solder using the specified solder, in the direction of the arrow, by sliding the soldering iron.



4. BRIDGE MODIFICATION PROCEDURE

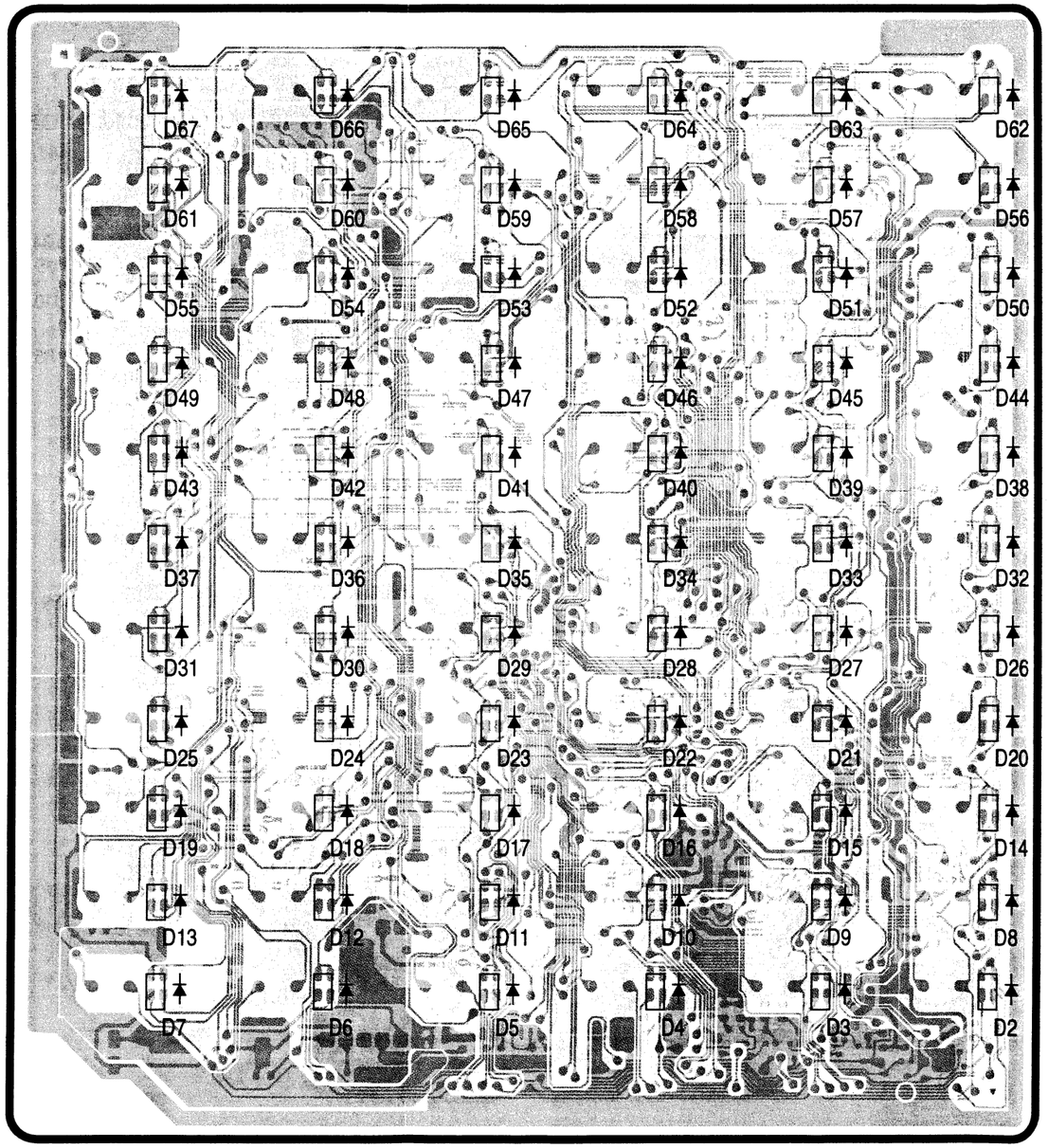
1) Lightly re-solder the bridged portion.

2) Remove the remaining solder along the pins using a soldering iron as shown in the figure below.



PRINTED CIRCUIT BOARD

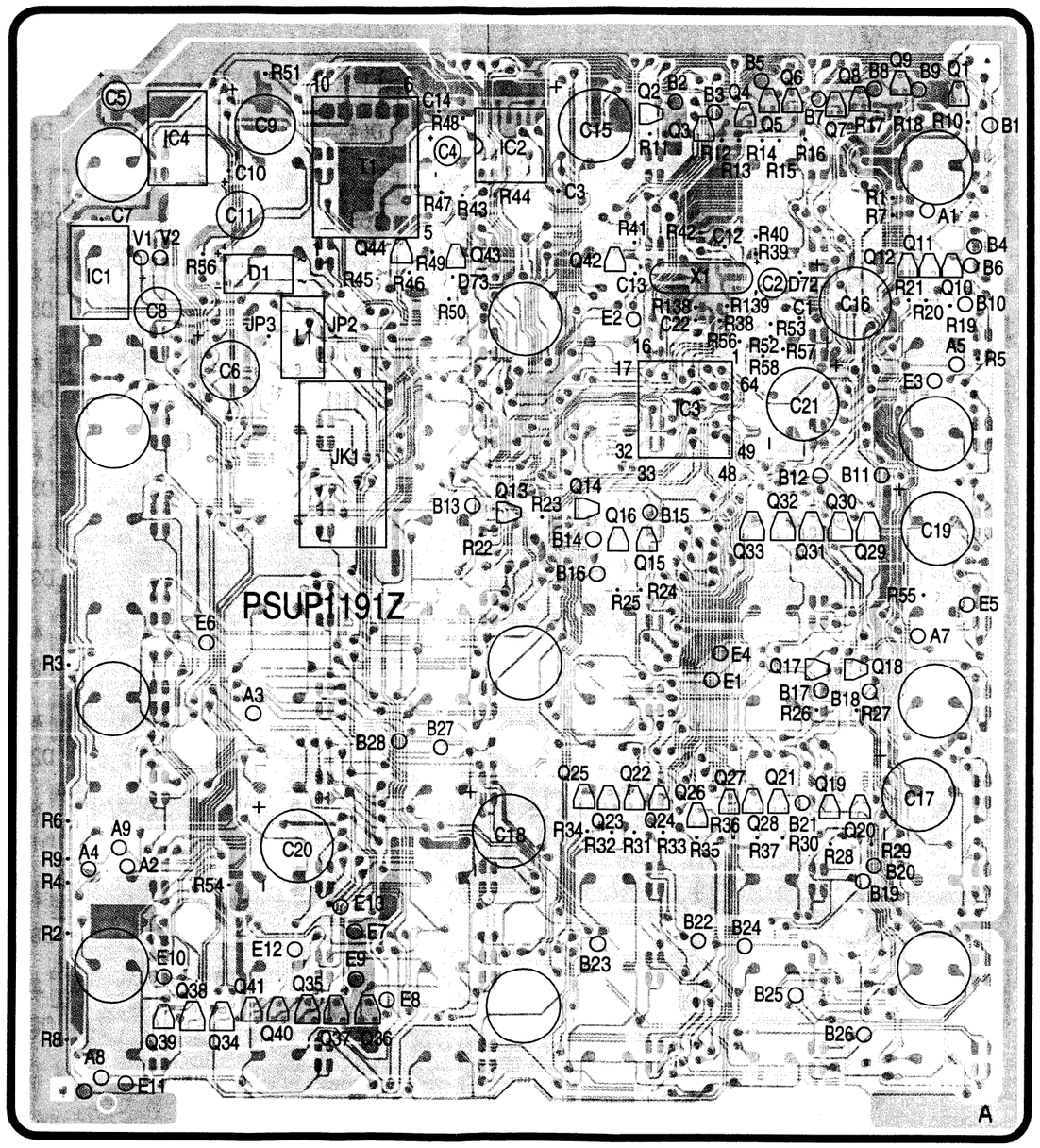
(BOTTOM VIEW)



Notes:
1. The circuit shown in ▭ on the conductor indicates printed circuit on the back side of the printed circuit board.
2. The circuit shown in ▭ on the conductor indicates printed circuit on the front side of the printed circuit board.
3. This printed circuit board may be modified at any time with the development of new technology.

PRINTED CIRCUIT BOARD

(COMPONENT VIEW)

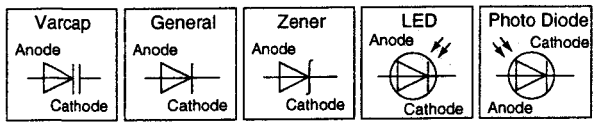


Notes:
1. The circuit shown in ▭ on the conductor indicates printed circuit on the back side of the printed circuit board.
2. The circuit shown in ▭ on the conductor indicates printed circuit on the front side of the printed circuit board.
3. This printed circuit board may be modified at any time with the development of new technology.

FOR SCHEMATIC DIAGRAM

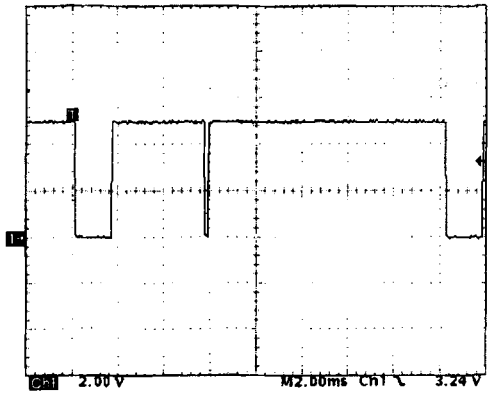
1. NOTES

1.DC voltage measurements are taken with oscilloscope from ground line. (Waiting condition.)
2.The schematic diagram may be modified at any time with the development of newtechnology.
3.

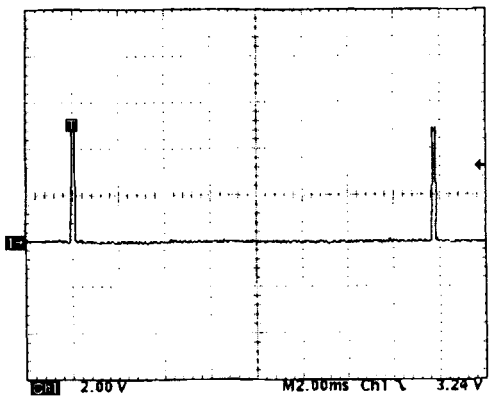


2. WAVEFORM

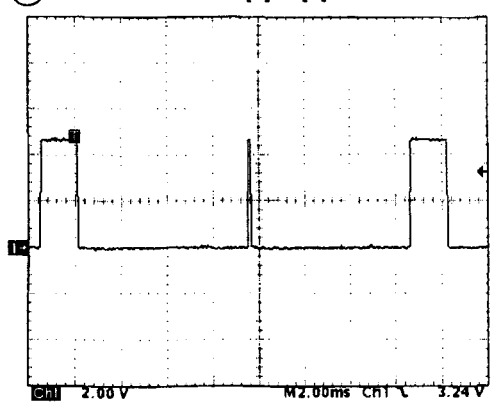
① KEY INPUT (KEY ON)



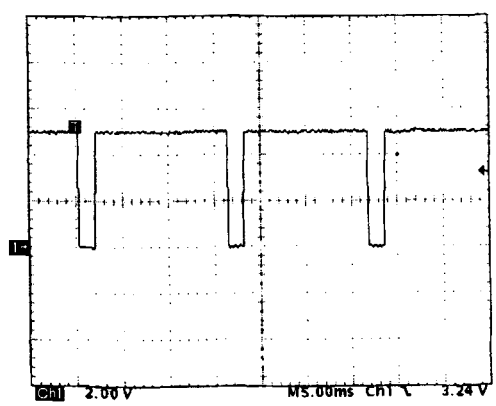
② LED CONTROL C[5]~C[7]



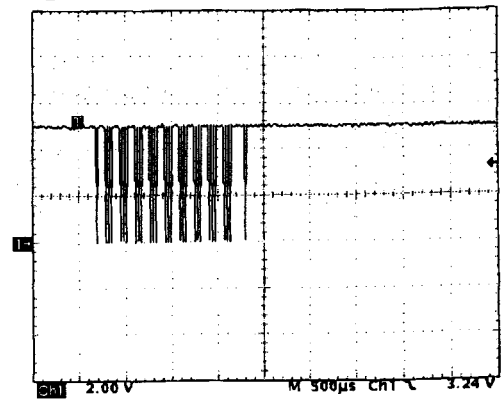
③ LED CONTROL C[0]~C[4]



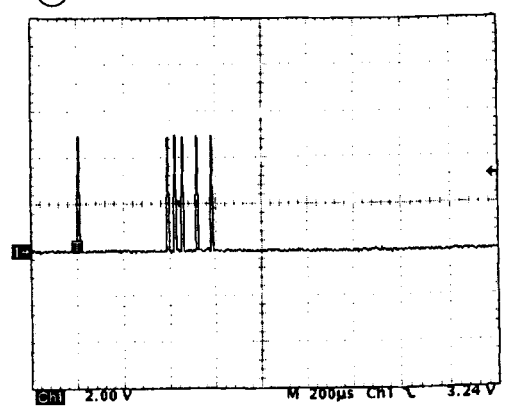
④ LED CONTROL SIGNAL L[0]~L[27] (LED ON)



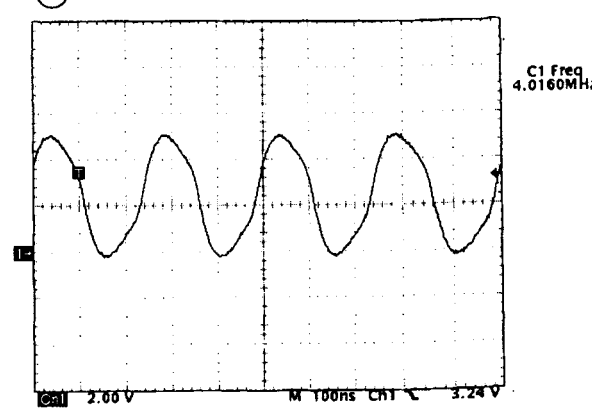
⑤ DCLR



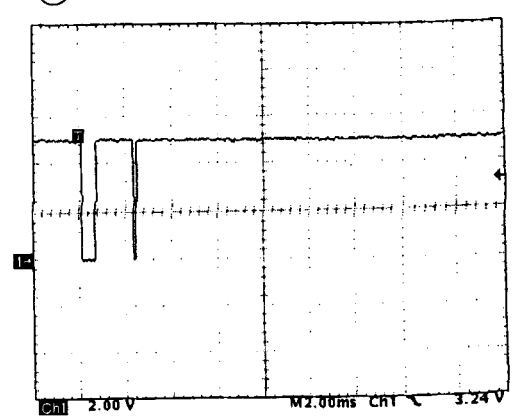
⑥ DOUT



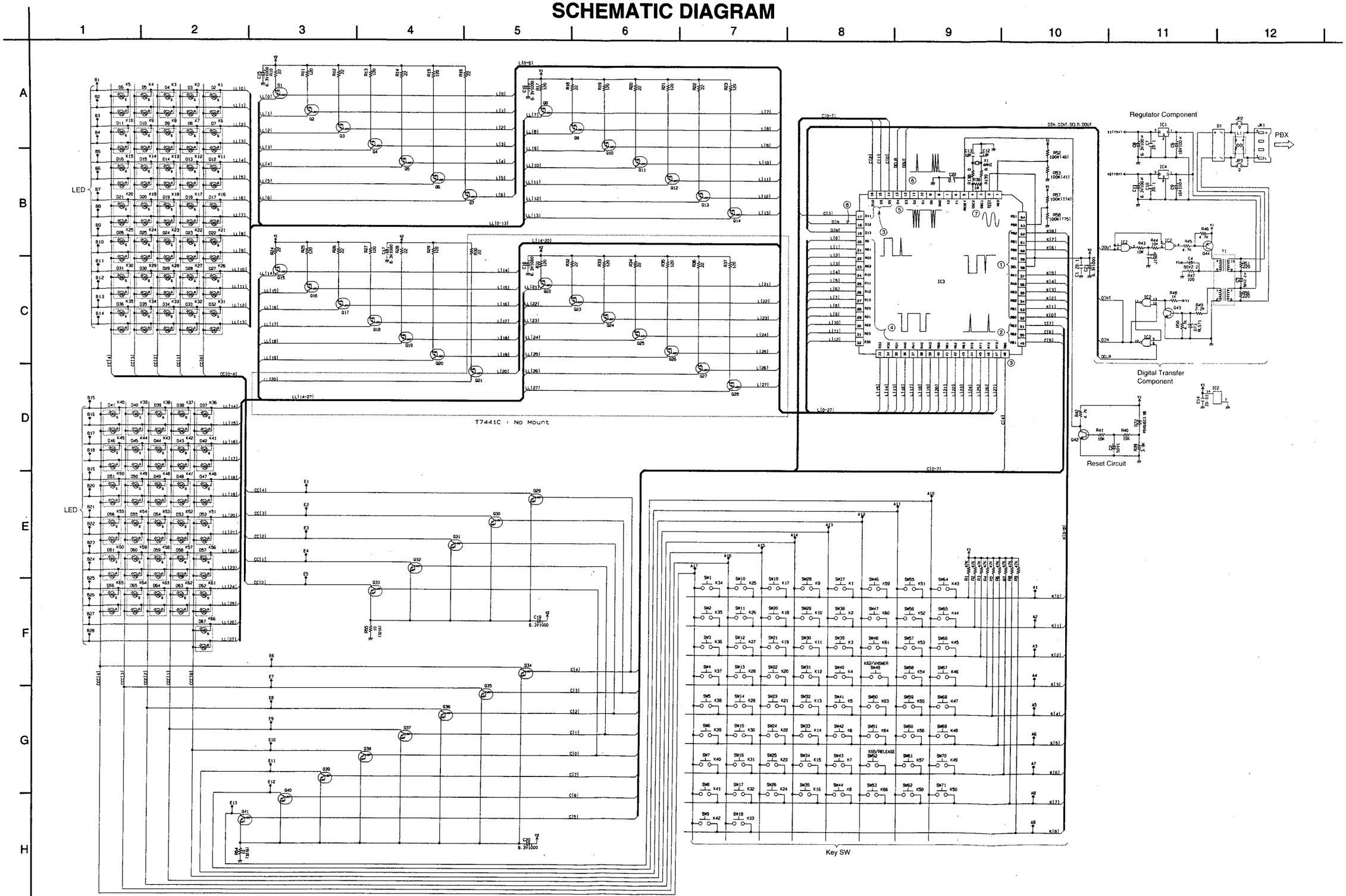
⑦ 4M



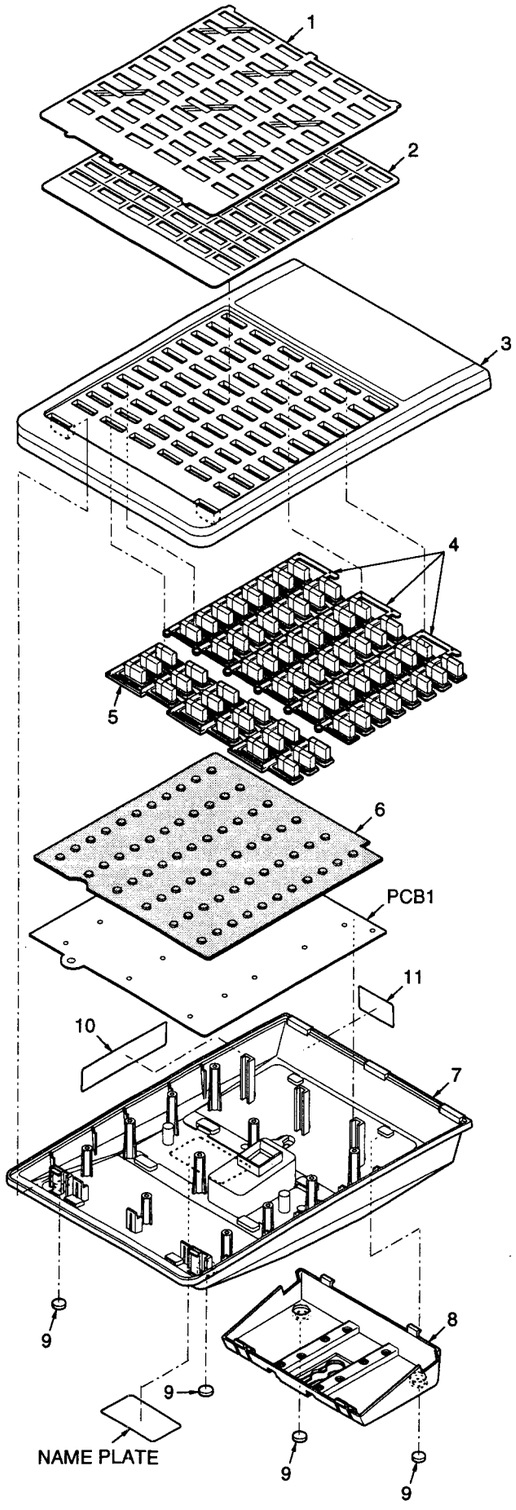
⑧ DIN



SCHEMATIC DIAGRAM

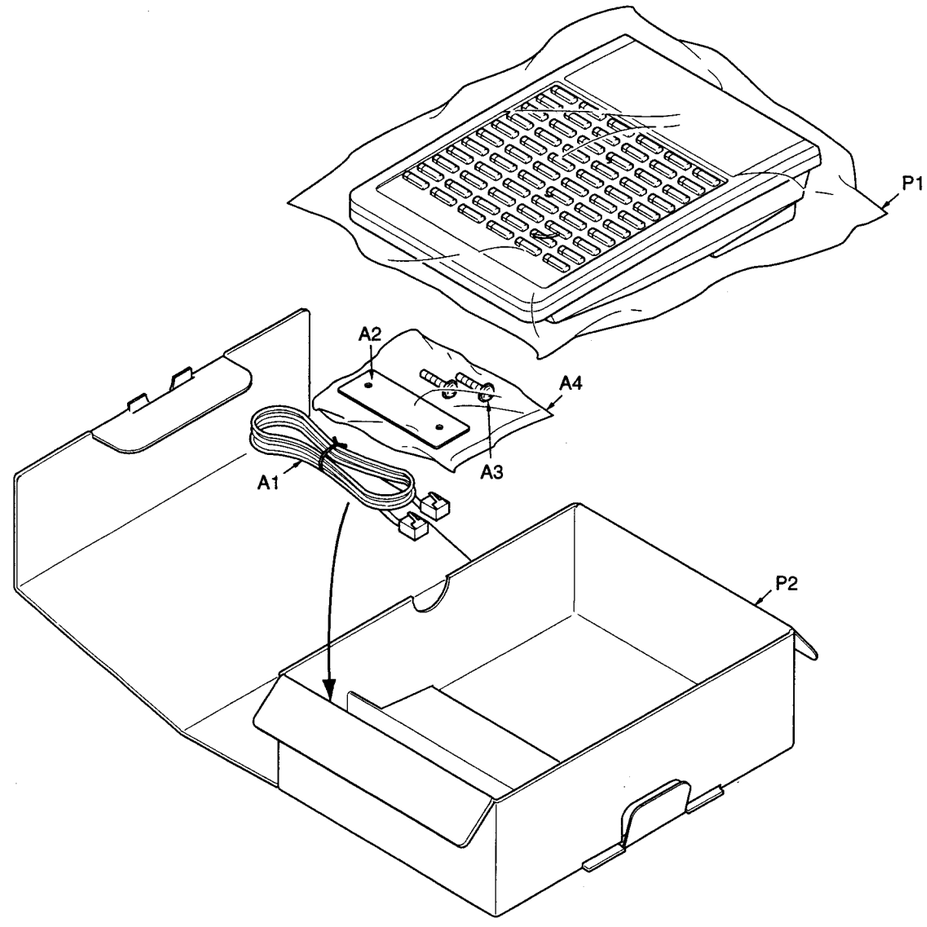


CABINET AND ELECTRICAL PARTS LOCATION



KX-T7440C/KX-T7440C-B

ACCESSORIES AND PACKING MATERIALS



This replacement parts list is for KX-T7440C/-B only. Refer to the simplified manual(cover) for other areas.

REPLACEMENT PARTS LIST

Model KX-T7440C/KX-T7440C-B

Notes:

1. The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.
2. Important safety notice.
   Components identified by ⚠ mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
3. The S mark indicates service standard parts and may differ from production parts.
4. RESISTORS & CAPACITORS
   Unless otherwise specified.
   All resistors are in ohms (Ω) k=1000Ω, M=1000kΩ
   All capacitors are in MICRO FARADS(μF) P= μμF
   *Type &Wattage of Resistor

Type

ERC:Solid	ERX:Metal Film	PQRD:Carbon
ERD:Carbon	ERG:Metal Oxide	PQRQ:Fuse
PQ4R:Chip	ERO:Metal Film	ERF:Wire Wound

Wattage

10,16,18:1/8W	14,25,S2:1/4W	12,50,S1:1/2W	1:1W	2:2W	5:5W

*Type & Voltage of Capacitor

Type

ECFD:Semi-Conductor	ECCD,ECKD,PQCBC,PQVP : Ceramic
ECQS:Styrol	ECQM,ECQV,ECQE,ECQU,ECQB : Polyester
PQCBX,ECUV:Chip	ECEA,ECSZ,ECOS : Electrolytic
ECMS:Mica	ECQP : Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	0F:3.15V	0J :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		0J:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description	Pcs
		CABINET AND ELECTRICAL PARTS	
1	PSHR1143Z	TRANSPARENT PLATE	1
2	PSGD1028Z	TEL. CARD (KX-T7440C)	1
2	PSGD1035Z	TEL. CARD (KX-T7440C-B)	1
3	PSKM1055Z1	CABINET BODY (KX-T7440C)	1
3	PSKM1055Z2	CABINET BODY (KX-T7440C-B)	1
4	PSBX1054Z1	BUTTON, 16KEY (KX-T7440C)	3
4	PSBX1054Z2	BUTTON, 16KEY (KX-T7440C-B)	3
5	PSBX1055Z1	BUTTON, 18KEY (KX-T7440C)	1
5	PSBX1055Z2	BUTTON, 18KEY (KX-T7440C-B)	1
6	PSSX1009Z	KEY SWITCH	1
7	PSKF1029Z1	CABINET, LOWER (KX-T7440C)	1
7	PSKF1029Z2	CABINET, LOWER (KX-T7440C-B)	1
8	PSKL1006Z1	STAND (KX-T7440C)	1
8	PSKL1006Z2	STAND (KX-T7440C-B)	1
9	PSHA1002Z	RUBBER PARTS, FOOT	4
10	PSQT1309X	LABEL, CAUTION (KX-T7440C)	1
10	PSQT1309W	LABEL, CAUTION (KX-T7440C-B)	1
11	PQQT11166Z	LABEL, NOTE	

Ref. No.	Part No.	Part Name & Description		Pcs
		ACCESSORIES AND PACKING MATERIALS		
A1	PQJA48W	CORD, TEL.		1
A2	PSMH1127Z	ANGLE		1
A3	XTW3+S12P	SCREW		2
A4	XZB10X10A04	BAG,POLYETHYLENE		1
P1	PQPP170Z	BAG,POLYETHYLENE		1
P2	PSPK1375Z	GIFT BOX (KX-T7440C)		1
P2	PSPK1418Z	GIFT BOX (KX-T7440C-B)		1
		MAIN BOARD PARTS		
PCB1	**PSWPT7440C**	**MAIN BOARD ASS'Y (RTL)**		1
		(ICs)		
IC1	PSVIBA05FP	IC		1
IC2	PQVITC4011BF	IC		1
IC3	PSVI4068A03H	IC	S	1
IC4	PSVIBA05FP	IC		1
		(TRANSISTORS)		
Q1-28	PQVTDTA143XU	TRANSISTOR(SI)		28
Q29-38	PQVTDTD133HK	TRANSISTOR(SI)		10
Q39,40,41	PQVTDTC143E	TRANSISTOR(SI)		3
Q42,43	2SC4081Q	TRANSISTOR(SI)		2
Q44	2SA1576Q	TRANSISTOR(SI)		1
		(DIODES)		
D1	PQVDS1ZB60F1	DIODE(SI)		1
D2-67	PQVDPY1204	LED	S	66
D72	PSVDUDZ39B	DIODE(SI)		1
D73	RLS71	DIODE(SI)		1
		(CAPACITORS)		
C1	PQCUV1E104MD	0.1	S	1
C2	PSCEV1HA010	1		1
C3	PQCUV1H151JC	150P		1
C4,5	PSCEV1HA2R2	2.2		2
C6	PSCEV1EA101	100		1
C7	PQCUV1E104MD	0.1	S	1
C8	PSCEV0JA101	100		1
C9	PSCEV1EA101	100		1
C10	PQCUV1E104MD	0.1	S	1
C11	PSCEV0JA101	100		1
C12,13	PQCUV1H120JC	12P		2
C14	PQCUV1H103KB	0.01	S	1
C15-21	PSCEV0JA102	1000		7
C22	PQCUV1E104MD	0.1	S	1
		(JACK)		
JK1	PSJJ1T011Z	JACK		1
		(RESISTORS)		
JP2,3	PQ4R10XJ000	0		2
R1-9	PQ4R10XJ473	47K		9
R10	PQ4R10XJ220	22		1
R11	PQ4R10XJ121	120		1
R12	PQ4R10XJ220	22		1
R13	PQ4R10XJ121	120		1
R14	PQ4R10XJ220	22		1
R15	PQ4R10XJ121	120		1
R16	PQ4R10XJ220	22		1

This replacement parts list is for KX-T7440C/-B only. Refer to the simplified manual(cover) for other areas.

Ref. No.	Part No.	Part Name & Description	Pcs
R17	PQ4R10XJ121	120	1
R18	PQ4R10XJ220	22	1
R19	PQ4R10XJ121	120	1
R20	PQ4R10XJ220	22	1
R21	PQ4R10XJ121	120	1
R22	PQ4R10XJ220	22	1
R23	PQ4R10XJ121	120	1
R24	PQ4R10XJ220	22	1
R25	PQ4R10XJ121	120	1
R26	PQ4R10XJ220	22	1
R27	PQ4R10XJ121	120	1
R28	PQ4R10XJ220	22	1
R29	PQ4R10XJ121	120	1
R30	PQ4R10XJ220	22	1
R31	PQ4R10XJ121	120	1
R32	PQ4R10XJ220	22	1
R33	PQ4R10XJ121	120	1
R34	PQ4R10XJ220	22	1
R35	PQ4R10XJ121	120	1
R36	PQ4R10XJ220	22	1
R37	PQ4R10XJ121	120	1
R38	PQ4R10XJ105	1M	1
R39	PQ4R10XJ392	3.9K	1
R40,41	PQ4R10XJ103	10K	2
R42	PQ4R10XJ472	4.7K	1
R43,44	PQ4R10XJ103	10K	2
R45,46	PQ4R10XJ472	4.7K	2
R47	PQ4R10XJ101	100	1
R48	PQ4R10XJ102	1K	1
R49	PQ4R10XJ222	2.2K	1
R50	PQ4R10XJ472	4.7K	1
R51	PQ4R10XJ221	220	1
R52	PQ4R10XJ104	100K	1
R54,55	PQ4R18XJ100	10	2
R56	PQ4R10XJ221	220	1
R57	PQ4R10XJ104	100K	1
R138,139	PQ4R10XJ000	0	2
		(TRANSFORMER)	
T1	PSLT9Z4A	TRANSFORMER	1
		(CRYSTAL OSCILLATOR)	
X1	PSVCCR0400B7	CRYSTAL OSCILLATOR	1

I (Q) KXT7440C
/KXT7440CB
Printed in Japan.
KM